Making Sense

- What is the big picture? Was I successful? Am I ready to make another move?
  - integrating information interpretation with task knowledge;
    building a “mental model” across actions and screens
  - errors or problems often detected and corrected here
- Design goal: organize and present information to match user’s task goals
  - aid decision to continue, elaborate, or change goals
  - orient next circuit around the task-action cycle
- Techniques: consistency, design programs, metaphors, information models

Consistency

- *Internal* consistency within a system
  - on the same screen: button shape & labels, fonts, etc.
  - from screen to screen: UI controls, layout, font family
  - applies to *text vocabulary* too
    Up/Down, Previous/Next *not* Up/Next, Previous/Down
- Why?
  - more rapid/accurate pattern induction (e.g., what buttons look like)
  - more confident interaction behavior
Consistency

- *External* consistency across different systems
  - or between the real world and a system
  - (in a set of task contexts)
- examples
  - e.g., the Mac family of apps, Windows, the Web
  - “down” means move the pointer down (never up)
- Why?
  - enables *transfer of learning* from one system to another
  - while mismatches lead to *interference*
- Caution: consistency can be in the eye of beholder
- 2nd caution: special needs of the user’s task
A Visual Design Program

- Visual features used consistently, design “signature”
  - e.g., title bar, tool palette, window border, title line, standardized set of components and layout
  - not necessarily a functional feature, e.g. special border

A Visual Design Program

- Promotes a sense of unity and coherence
  - easier to make connections from screen to screen
- Caution: repeated gratuitous decoration or animation creates a design program that detracts
  - bright saturated colors, black backgrounds
  - animated email links, performing titles
Visual Metaphors

- Serve both designer and user
  - for designer: generate ideas, assure external consistency, reduce number of decisions
  - for user: leverage prior knowledge, evoke sense making
- One metaphor may influence multiple design issues

<table>
<thead>
<tr>
<th>library</th>
<th>activities:</th>
<th>browsing, borrowing, abstracting service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>information:</td>
<td>shelves, card catalog, alphabetical order</td>
</tr>
<tr>
<td></td>
<td>interaction:</td>
<td>sequential browsing, cover first, check-out</td>
</tr>
</tbody>
</table>

→ other examples: maps, shopping cart, messy desktop

- Caution: beware of over-literal application
  - less refined, and the potential of computational medium may be undermined

A physical calculator as a visual metaphor

What is good or bad about this design?
Information Models

- An “information space” that users navigate
  - information integration, a key aspect of mental model
- Want a structure that is simple and coherent, but at the same time comprehensive and flexible
- Many techniques for designing information models
  - hierarchy: menu systems, folders, index pages
  - directed graph: hypertext, associative links
  - spatial structures: tables, maps, 3D structures
- Key tradeoffs are usually flexibility and complexity
  - again, key is a good understanding of task needs

Which network is easier to understand?
Menu Hierarchies

- Specify a left-to-right complex name
  - `<type/context> <unique function> <parameters>`

- many convenient hierarchies (e.g. product codes) are not user-oriented
- is parent node a meaningful “name” for its children?
  - e.g., the Special menu in Mac OS 9

Menu Hierarchies

- Careful analysis of breadth vs depth
  - shallow and broad is usually faster to navigate (Hick’s Law)

- but boundary conditions, e.g. navigation within menu
- Hick-Hyman choice reaction time
  - \( RT = a + b \times \log_2(n) \), \( n \) is number of choices
  - e.g., 3 deep/9 wide vs. 9 deep/3 wide
  - \( 3(a + b \times \log_29) < 9(a + b \times \log_23) \)

Dynamic Information Models

- Animated displays possible with standard PCs
  - visualize partial data set, user pans or zooms to see more
Dynamic Information Models

- animated movement promotes perception of 3D
- user experiences as “moving around in” a structure

Focus+context displays (also called “fisheye views”)
- entire dataset at low resolution, with focal area enlarged
Dynamic Information Models

- View filtering based on task-related attributes
- Dynamic information retrieval, user-manipulable variables

Film Finder

Dynamic Information Models

- Multiple coordinated views (tiled windows, frames)
  - one view may “index” others, control the updates
  - more complex case has multi-way dependencies

View Matcher
The BJPlayer adds the card passed as an argument in this message to its current hand. It also checks to see if the card leads to a blackjack or bust. If so, it reports this to its dealer, the Blackjack instance.

"Adds one card, reporting a blackjack or bust if it happens."

```smalltalk
self viewMatchList.
hand add: aCard.
dealer window changed: #dealerPane:
  (hand blackjack)
ifTrue: [ dealer blackjack: self ].
(hand bust)
```